

134400-1

REMARKS

Claims 1-37 are pending in the present Application. Claims 1, 15, 24, 32, and 37 have been amended, leaving Claims 1-37 for consideration upon entry of the present Amendment.

Claims 1, 24, and 32 have been amended to define the polymeric resin as --polyvinyl chloride, polyolefin, polyamide, polysulfone, polyimide, polyether imide, polyether sulfone, polyphenylene sulfide, polyether ketone, polyether ether ketone, ABS resin, polystyrene, polybutadiene, polyacrylate, polyacrylonitrile, polyacetal, polycarbonate, polyphenylene ether, ethylene-vinyl acetate copolymer, polyvinyl acetate, liquid crystal polymer, ethylene-tetrafluoroethylene copolymer, polyvinyl fluoride, polyvinylidene fluoride, polyvinylidene chloride, polytetrafluoroethylene, or combinations comprising at least one of the foregoing polymeric resins-- . Support for this amendment can be found in the Specification as originally filed in Paragraph [0017].

Claim 15 has been amended to replace the term --1,8-dialkylaminoanthraquinone-- with "1,8-bis(cyclohexylamino)anthraquinone, 1,8-bis(isopropylamino)anthraquinone, 1,8-bis(N,N-diethylaminoethylamino)anthraquinone, or 1,8-bis(3-N,N-dimethylaminopropylamino)anthraquinone." Support for the amendment can be found in the Specification as filed at paragraph [0036]. No new matter has been introduced by these amendments.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Objections

Claims 1, 24, and 32 were objected to as containing the term "3-N,N-dimethylaminopropylamine." The Applicants have amended the claim to contain the term "3-N,N-dimethylaminopropyl" as suggested by the Examiner.

Claim 15 was objected to for failing to further limit the subject matter of a previous claim. Claim 15 has been amended to remove the term "1,8-dialkylaminoanthraquinone" and replaced with the term "1,8-bis(cyclohexylamino)anthraquinone, 1,8-bis(isopropylamino)anthraquinone, 1,8-bis(N,N-diethylaminoethylamino)anthraquinone, or 1,8-bis(3-N,N-dimethylaminopropylamino)anthraquinone" as described above. Again, support for

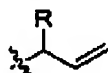
134400-1

the amendment can be found in the Specification as filed at paragraph [0036].

In view of the above amendments, the Applicants respectfully request removal of the claim objections to claims 1, 15, 24, and 32.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1-37 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner states that, with respect to claims 1, 24, 32, and 37, the term --an allyl group containing 3 to 20 carbon atoms-- "causes confusion since an allyl group, by definition, only has 3 carbon atoms." The Applicants respectfully disagree that there is confusion. As provided in the Specification at page 15, paragraph [0036], lines 6-8 the allyl group may contain a substituent. Provided below is one general structure of an allyl group having, for example, a substituent R.



One of ordinary skill in the art can envision the R substituent to contain up to 17 carbon atoms in accordance with the range "3 to 20 carbon atoms" as provided in the claims. The core allyl structure is still present, but with substitution. As the limitation of --an allyl group containing 3 to 20 carbon atoms-- is not indefinite, reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 102(b)

Claim 37 stands rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 3,875,191 to Toth ("Toth"). Applicants respectfully disagree in view of the amendment to claim 37.

Toth generally discloses a process for the production of α,α' -dihydroxylaminoanthraquinone or α -monohydroxylaminoanthraquinone from a mixture comprising at least two components selected from α,α' -dinitroanthraquinone, α -mononitroanthraquinone and anthraquinone, which process comprises subjecting the mixture to reduction conditions to reduce all the nitro groups of at least one nitro component, the resulting

134400-1

reaction mixture being treated with alkali-metal basic medium to separate the more soluble hydroxylamino compound from the other components of the reaction mixture. By the process the hydroxylamino compounds can be obtained in high purity and then be reduced to obtain the amino compounds in corresponding purity, the amino compounds being important intermediates in the dyestuffs industry. (Toth Abstract)

Claim 37 of the present application, as currently amended, is generally directed to a colorant comprising a 1,8-diaminoanthraquinone derivative having a purity of greater than or equal to about 90 wt%, wherein the amino groups at the 1 and 8 positions are substituted with an allyl group, a 5-membered heterocyclic ring, or a 6-membered heterocyclic ring.

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

Toth fails to teach or suggest 1,8-diaminoanthraquinones where the amino groups at the 1 and 8 positions are substituted with an allyl group, a 5-membered heterocyclic ring, or a 6-membered heterocyclic ring. Toth only teaches α,α' -dihydroxylaminoanthraquinone, α -monohydroxylaminoanthraquinone, α,α' -diaminoanthraquinone, and α -monoaminoanthraquinone. Furthermore, Toth fails to teach or suggest the particular 1,8-diaminoanthraquinones of the claimed purity levels as required by claim 37. As Toth fails to teach each and every limitation of claim 37, reconsideration and allowance of the claim is respectfully requested.

Claim 37 is rejected under 35 U.S.C. 102(b) as anticipated by US 3,933, 868 to Thiem et al. ("Thiem").

Thiem generally discloses a process for the preparation of 1,5- and/or 1,8-diaminoanthraquinone by reaction of 1,5- and/or 1,8-dinitroanthraquinone with ammonia in organic solvents, characterized in that the reaction is carried out in ethers, aliphatic or cycloaliphatic hydrocarbons or optionally alkyl-substituted aromatic hydrocarbons or in mixtures of these compounds. (Thiem Abstract)

Although Thiem discloses 1,8-diaminoanthraquinone, it fails to teach or suggest the particular 1,8-diaminoanthraquinones as required by claim 37, that is 1,8-diaminoanthraquinones where the amino groups at the 1 and 8 positions are substituted with an allyl group, a 5-

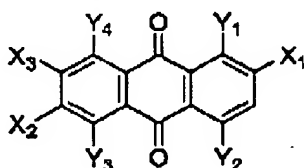
134400-1

membered heterocyclic ring, or a 6-membered heterocyclic ring. As Thiem fails to teach each and every claim limitation of claim 37, Thiem fails to anticipate the claim. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 37 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Thiem or over U.S. Patent No. 4,689,171 to Blunck et al. ("Blunck"). The Applicants respectfully disagree.

Blunck generally discloses dyestuffs of the formula



in which Y₁, Y₂, Y₃, Y₄ designate hydrogen, halogen, nitro, amino, alkylamino, arylamino, cycloalkylamino, aralkylamino, alkylthio, arylthio, cycloalkylthio, aralkylthio or hydroxyl, it being possible for the hydrocarbon radicals to be substituted, with the proviso that (a) at least one of the substituents Y₁, Y₂, Y₃ or Y₄ does not denote hydrogen, (b) a maximum of two of the substituents Y₁, Y₂, Y₃ and Y₄ designate halogen and either (c₁) X₁, X₃ represent halogen, --R₁, --OR₁ or --SR₁, R₁ denoting optionally substituted alkyl, it being possible for the alkyl chain to be substituted by an oxygen atom or several non-adjacent oxygen atoms, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted aralkyl or an optionally substituted heterocyclic radical and X₂ designating hydrogen, (c₂) X₁, X₂ denote halogen, [*substituted phenyl, phenoxy, and thiophenyl*] or (c₃) X₁ designates halogen, X₂ designates --OR₁ or --SR₁ and X₃ designates hydrogen.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5

134400-1

U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Thiem fails to render claim 37 obvious as Thiem fails to teach or suggest the particular 1,8-diaminoanthraquinones as required by claim 37. There is no teaching of 1,8-diaminoanthraquinones where the amino groups at the 1 and 8 positions are substituted with an allyl group, a 5-membered heterocyclic ring, or a 6-membered heterocyclic ring. Thiem only teaches 1,8-diaminoanthraquinones having no substituents or hydroxyl substituents on the amines, which are very different from, and in no way suggests, what is required in claim 37. Furthermore, the reference fails to teach or suggest that these particular 1,8-diaminoanthraquinones should have a purity of greater than or equal to about 90 wt %. Accordingly, the Applicants respectfully request reconsideration and removal of the § 103 rejection against claim 37.

Additionally, Blunck also fails to render claim 37 obvious. Blunck's disclosure of a general anthraquinone formula (See formula I of Blunck) is too broad to render the particular 1,8-diaminoanthraquinones of claim 37 obvious. It is worthy of note that all of Blunck's exemplary 1,8-diaminoanthraquinones contain unsubstituted amines at positions 1 and 8. One of ordinary skill in the art, when reading Blunck, would not be motivated to substitute the amine groups at positions 1 and 8 with an allyl group, a 5-membered heterocyclic ring, or a 6-membered heterocyclic ring as is required by claim 37. Accordingly, the Applicants respectfully request reconsideration and removal of the rejection to claim 37.

Claims 1-6, 8-15, 17-25, 28-30, and 32-36 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 3,853,807 to Hunter ("Hunter"). The Applicants respectfully disagree.

Hunter generally discloses particular azabenzanthrone and diazabenzanthrone dyes that have been found to be peculiarly resistant to spontaneous high temperature degradation, and to be particularly useful as colorants for photographic film products made by extruding a dyed polyester film base.

As amended, independent claims 1, 24, and 32 require the polymeric resin to be polyvinyl chloride, polyolefin, polyamide, polysulfone, polyimide, polyether imide, polyether sulfone,

134400-1

polyphenylene sulfide, polyether ketone, polyether ether ketone, ABS resin, polystyrene, polybutadiene, polyacrylate, polyacrylonitrile, polyacetal, polycarbonate, polyphenylene ether, ethylene-vinyl acetate copolymer, polyvinyl acetate, liquid crystal polymer, ethylene-tetrafluoroethylene copolymer, polyvinyl fluoride, polyvinylidene fluoride, polyvinylidene chloride, polytetrafluoroethylene, or a combination thereof.

Hunter fails to teach or suggest the particular 1,8-diaminoanthraquinones in combination with the particular polymeric resins as outlined in currently amended claims 1, 24, and 32. Hunter only discloses polyesters containing azabenzanthrone and diazabenzanthrone dyes. Still further, Hunter fails to teach or suggest the required purity of the 1,8-diaminoanthraquinones.

Additionally, one of ordinary skill in the art would not be motivated to add anthraquinone dyes to polyester, let alone one of the resins listed in the independent claims 1, 24, or 32, as Hunter warns that

[i]t is noteworthy that, whereas the azabenzanthrone and diazabenzanthrone materials described above can be generically considered to be "anthracene-derived" dyes, it is recognized that by far the greater majority of such "anthracene-type" dyes (including many anthraquinone-type dyes) are either unstable or incompatible in polyester systems such as those about which the present invention is concerned. For example, dyes of the following type have been found to spontaneously degrade excessively when they are held in molten poly-(ethylene terephthalate) for one hour at a temperature of 280°C (at the 500 ppm level)...1,4,5,8-tetraanilino anthraquinone...1,8-bis-cyclohexyl anthraquinone...

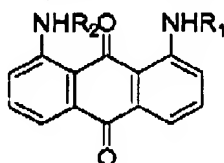
(Hunter Column 6, line 51 to Column 7, line 1, and Column 8, line 1) Hunter teaches away from using many anthraquinone-type dyes in polyester systems, as they can be unstable or incompatible. As the compositions of the present claims can be molded into colored polymeric article, one of ordinary skill in the art would avoid any colorants that would degrade at molding or processing temperatures. Accordingly, the Applicants respectfully request reconsideration and removal of the rejections to independent claims 1, 24, and 32 as well as their dependent claims 2-6, 8-15, 17-23, 25, 28-30, and 33-36.

Claims 1-26, 28-30, and 32-36 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 5,882,358 to Smith et al. ("Smith") in view of the combined

134400-1

teachings of U.S. Patent No. 4,735,631 to Orelup ("Orelup") and U.S. Patent No. 3,923,454 to Genta ("Genta"). Applicants respectfully disagree.

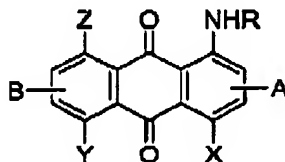
Smith generally discloses automatic transmission fluid containing a red dye. The red dye includes 1,8-diaminoanthraquinone compounds of the formula



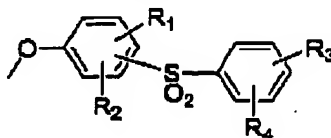
where R_1 and R_2 are the same or different alkyl or substituted alkyl groups, a cycloalkyl group containing at least 3 carbons or 2-alkylphenyl or 2-alkyloxyphenyl group. The alkyl, cycloalkyl and substituted alkyl groups contain at least 2 carbons each. The alkyl groups preferably contain 2-12 carbons and the substituted alkyl groups contain up to 12 atoms. (Column 2, lines 10-33)

Oretup generally discloses colored petroleum markers or tagging compounds that are 1,4-hydroxyanthraquinones which function as both dyes and markers. Oretup does disclose that certain 1,4-diaminoanthraquinones "have utility as hair dyes; dye-stuffs; blue dyes for polyester fibers; and pigments for transfer printing on polyesters, polyacrylonitriles or paper. None of these compounds are disclosed to be useful as markers or dyes for organic liquids." (Oretup Column 3, lines 15-63) The organic liquids that Oretup is describing include petroleum fuels.

Genta generally discloses anthraquinones containing phenylsulfonyl groups suitable for the dyeing of polyester materials and for the coloration of rigid plastic materials. The aminoanthraquinone includes

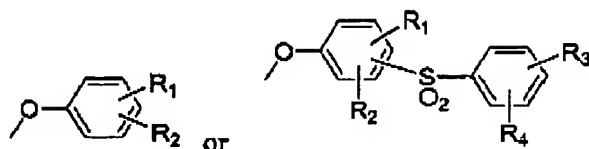


R is hydrogen or lower alkyl; two of X , Y and Z are independently hydroxy, amino or lower alkylamino; and the other of X , Y and Z is independently hydrogen, hydroxy, amino, nitro, or lower alkylamino; one of A and B is an arylsulfonyl group of the formula



134400-1

and the other of A and B is hydrogen,



each of R_1 and R_2 is independently hydrogen, chlorine, bromine, lower alkyl or lower alkoxy; and

each of R_3 and R_4 is independently hydrogen, chlorine, bromine, lower alkyl, lower alkoxy or nitro; each aminoanthraquinone of the mixture having bonded to aromatic carbon atoms an average of 0.001 to 4.0 chlorine or bromine atoms. (Column 1, line 40 to column 2, line 15)

Smith, Oretup, and Genta, alone or together, fail to provide a motivation to combine the references to "utilize an anthraquinone dye as disclosed by Smith et al in a purity greater than or equal to 90 wt% in a polymeric resin and processed as taught by Oretup and Genta." (Office Action dated 9/26/2005, page 7) Although Smith teaches 1,8-diaminoanthraquinone compounds for use in transmission fluid, it does not teach their use in polymeric resins. Oretup teaches that certain 1,4-diaminoanthraquinones have been used for dyes for polyester and polyacrylonitriles, but Oretup only teaches 1,4-hydroxyanthraquinones as petroleum markers. Oretup never discloses 1,8-diaminoanthraquinones for use as either petroleum markers or dyes for polyester or polymeric material in general. Genta teaches anthraquinones containing phenylsulfonyl groups which are suitable for the dyeing polyester materials and for the coloration of rigid plastic materials. Genta fails to teach that 1,8-diaminoanthraquinones free of phenylsulfonyl groups can be used for coloring polymeric resins. Oretup and Smith fail to provide this motivation. Taken together, one of ordinary skill in the art would not be motivated to dye polymeric resins with the 1,8-diaminoanthraquinone compounds of Smith.

Furthermore, the references fail to teach or suggest each claim limitation as is required by claims 1, 24, and 32, specifically, none of the references teach the particular 1,8-diaminoanthraquinone derivatives, where R is cyclohexyl, isopropyl, 3-N,N-dimethylaminopropyl, N,N-diethylaminoethyl, an allyl group containing 3 to 20 carbon atoms, a hydroxyl group, a 5-membered heterocyclic ring, and a 6-membered heterocyclic ring; and where $R_2 - R_7$ are, individually, selected from the group consisting of a hydrogen atom, an aliphatic

134400-1

group, an aromatic group, a heterocyclic group, a halogen atom, a cyano group, a nitro group, --COR₉, --COOR₉, NR₁₀COR₁₁, --NR₁₀SO₂R₁₁, --CONR₉R₁₀, --CONHSO₂R₁₁, and --SO₂NHCOR₁₁; in which R₉ and R₁₀ are, individually, selected from the group consisting of a hydrogen atom, an aliphatic group, an aromatic group, and a heterocyclic group; wherein R₁₁ is selected from the group consisting of an aliphatic group, an aromatic group, and a heterocyclic group. Additionally the references fail to teach or suggest these particular 1,8-diaminoanthraquinone derivatives having the required purity and in combination with the particular list of polymeric resins. Accordingly, reconsideration and removal of the rejections is respectfully requested.

Claims 1-13, 16-26, 28-30, and 32-36 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over GB 985,970 to Turner et al. ("Turner") in view of the combined teachings of U.S. Patent No. 4,655,970 to Priester et al. ("Priester") and Genta. Applicants respectfully disagree.

Turner generally discloses certain 1,5- and 1,8-diaminoanthraquinones and their acid addition salts as active against infections of *Hymenolepis nana* in mice and *Oöchoristica symmetrica* in mice. 1,8-Bis(2-diethylaminoethylamino)anthraquinone was specifically disclosed.

Priester generally discloses a process for the manufacture of quaternized diaminoanthraquinones by reacting alpha-nitro-anthraquinone with an amine to give 1-aminoanthraquinone (B), halogenating, preferably brominating the compound (B) to give 1-amino-4-halogeno- or 1-amino-2,4-dihalogeno-anthraquinone (C), condensing the compound (C) with a diamine or with an amine to give 1,4-diaminoanthraquinone (D) and subsequently quaternizing compound (D) to give the corresponding quaternized anthraquinone compound (E). No 1,8-diaminoanthraquinones are disclosed, only 1,4-diaminoanthraquinone.

One of ordinary skill in the art would not be motivated to combine the teachings of Turner, Priester, and Genta as Turner is directed to treating infections of *Hymenolepis nana* and *Oöchoristica symmetrica* in mice, and not for the dyeing of polyester materials or coloration of rigid plastic materials like Genta. It is basically nonanalogous art. Although Priester discloses quaternized forms of 1,4- diaminoanthraquinones which can be used as cationic dyes, it fails to

134400-1

teach or suggest 1,8-diaminoanthraquinone for either treating infections or coloring polymeric resin. As there is no motivation for one of ordinary skill in the art to combine Turner, Priester, and Genta, the Applications respectfully request reconsideration and removal of the claim rejections to claims 1-13, 16-26, 28-30, and 32-36

Claims 27 and 31 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Smith in view of the combined teachings of Orelup and Genta or Turner in view of the combined teachings of Priester and Genta, either of which and further in view of U.S. Patent No. 5,747,632 to Adachi et al. ("Adachi"). Applicants respectfully disagree.

Adachi generally discloses polycarbonate resin with high flowability having a viscosity average molecular weight (Mv) of 13,000 to 20,000 and containing below 1% by weight of low molecular weight carbonate compounds having the range of molecular weight 1,000 or below and at least 10% by weight of a polycarbonate oligomer having the range of molecular weight 2,000 to 5,000.

Claims 27 and 31 are both ultimately dependent upon independent claim 1. For reasons discussed above, claim 1 has not been rendered obvious over Smith, Orelup, and Genta, or Turner, Priester, and Genta. Adachi only provides a teaching as to the molecular weight of a particular polycarbonate. Adachi does not provide the necessary teaching or suggestion that is lacking in the cited references to render claim 1 obvious. Accordingly, reconsideration and removal of the rejections are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the objection(s) and rejection(s) and allowance of the case are respectfully requested.


134400-1

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 07-0893.

Respectfully submitted,

CANTOR COLBURN LLP

By


Roberta L. Pelletier
Registration No. 46,372

Date: November 10, 2005
CANTOR COLBURN LLP
55 Griffin Road South
Bloomfield, CT 06002
Telephone (860) 286-2929
Facsimile (860) 286-0115
Customer No.: 43248